Table I below contains the microencapsulation results of each synthesis.

TABLE I

Microencapsulation results for each acetylated-poly(L-lysine) synthesized.

Surfactant	Acetic Anhydride/ Lysine Residues (mol/mol)	Microencapsulation Properties
AP-1	5	"Large" Beads
AP-2	15	(d ≈ 1 mm)
AP-3	30	Particles Rapidly
AP-4	50	Aggregated
AP-5	100	Particles (30–120 μm) Aggregated in 10–60 min.
AP-6	300	Stable Microspheres
AP-7	700	(30–60 μm)

Acetylated poly(L-lysine) synthesized from varied molar ratio of acetic anhydride to lysine residues showed different microencapsulation properties. The higher the mole excess of acetic anhydride over lysine residues, the more stable the o/w emulsion, and the better microspheres that could be obtained. Microspheres prepared from AP6 and AP7 were spherical with a relatively smooth surface, indicated by scanning electron micrography (See FIG. **3**), and their size was about 30–60 μm.

Determination of Free ϵ-amino Groups on the Surface of Microspheres Comprising AP-6 and AP-7.

Sulfo-succinimidyl-4-0-(4,4'-dimethoxytrityl)-butyrate (sulfo-SDTB) was obtained from Pierce. A fresh stock solution of the reagent was prepared as follows: sulfo-SDTB was dissolved in DMF and then mixed in a sodium bicarbonate buffer (50 mM, pH 8.5) at a 5–10% v/v ratio (DMF/buffer). The final sulfo-SDTB concentration was 1 mM. Five standards were prepared by serial dilutions with 35% perchloric acid, which were used to prepare a calibration curve for the 4,4'-dimethoxytrityl cation. Microspheres were incubated with 1 mM sulfo-SDTB stock solution for 2–10 minutes. Excess reagent was discarded and the microspheres were washed thoroughly. With the addition of 2 ml 35% percholoroic acid, microspheres were dissolved and then the solution was filtered through a 0.22 μm Millipore membrane. Absorbance readings of the 4,4'-dimethoxytrityl cation were taken at a wavelength of 498 nm using a Diode-array UV/Vis spectrophotometer zeroed with 35% perchloric acid solution. Results of lysine residue determination by sulfo-SDTB showed the presence of free amino groups on microsphere surface. A calibration curve of lysine residue determination is shown in FIG. **4**. The content of free amino groups on the surface of microspheres prepared from AP6 and AP7 is about 2 μmole per gram of bulk polymer, which corresponds to a AP loading of 0.03% (w/w).

RESULT OF LYSINE RESIDUE DETERMINATION

	Lysine residue on PLGA microspheres (umol/g)	Surfactant loading (%, w/w)	% of initial lysine residues incorporated
Microspheres (AP-6)	2.3	0.03%	33.7%
Microspheres (AP-7)	2.2	0.03%	28.6%

Free ϵ-amino ligatable functional group concentration was determined to be about 2 μmol per gram of bulk polymer. This level of free ϵ-amino groups corresponds to a surfactant loading of 0.03% (w/w), which is much lower than the 2% loading level that would effect polymer bulk properties if the poly lysine was co-polymerized with the PLGA as a block copolymer.

Retention Kinetics of Polylysine on the Surface of Microspheres Comprising AP-6 and AP-7

Retention kinetics of the conjugatable free amino groups on the microspheres surface was studied in phosphate buffered saline (PBS) at 37° C. Retained content of unmodified lysine residues on microsphere surface was determined by sulfo-SDTB as described above.

Retention of unacetylated lysine residues on microspheres surface is shown in FIG. **5**. A significant portion of the lysine residues was retained on the microsphere surface for more than two weeks. Hydrolysis of AP and easier access of sulfo-SDTB to the buried free amino groups may have contributed to the increased lysine content on the microsphere surface between 3 days and two weeks. Thus, a significant portion of the lysine residues were retained on the microsphere surface for two weeks.

Example 9

PLGA Microspheres Having Albumin Conjugated to the ϵ-amino Groups of Acetylated Poly (L-lysine)

Bovine serum albumin (BSA) was conjugated to the ϵ-amino Groups of the acetylated poly (L-lysine) in the microspheres prepared as described above in example 7. Commercial BSA was partially reduced with dithiothreitol (DTT) before conjugation. SH groups on BSA molecules were detected by Ellman's assay. S-carboxymethyl-albumin was used as a control reagent to determine the non-specific adsorption of BSA to the microspheres. Conjugation or adsorption of BSA on the microspheres was determined by the decrease in the amount of BSA in the incubating solution. The results are shown in the Table below:

RESULT OF CONJUGATION OF ALBUMIN (BOVINE) REDUCED OR S-BLOCKED, TO THE MICROSPHERES

Protein used in conjugation	Protein retained on microsphere
Reduced BSA (6.7 SH/BSA)	46.4 mg BSA/g microsphere
S-carboxymethyl-BSA	0

Although the invention has been described with regard to a number of preferred embodiments, which constitute the best mode presently known to the inventors for carrying out this invention, it should be understood that various changes and modifications as would be obvious to one having the ordinary skill in this art may be made without departing from the scope of the invention which is defined by the claims which are appended hereto.

What is claimed is:

1. A method for preparing a biocompatible polymeric matrix having functional groups on the surface thereof, comprising:

a) providing a first solution comprising a poly lactide-co-glycolide base polymer and an organic solvent;

b) providing a second solution comprising a surface-active functional polymer and a solvent;

c) mixing said first solution with said second solution to provide an emulsion in which chains of the base polymer become physically entangled with chains of the surface-active polymer; and

d) evaporating said organic solvent to provide a polymeric matrix comprising chains of the base polymer which are physically entangled with chains of the surface-active polymer.